AVR® DD Family

AVR64DD14/20

www.microchip.com Product Pages: AVR64DD20, AVR64DD14

Introduction

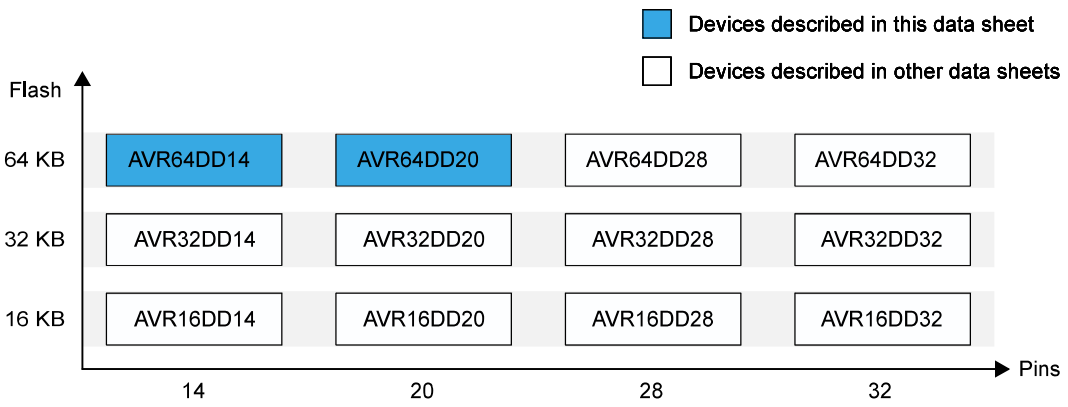
The AVR64DD14/20 microcontrollers of the AVR® DD Family of microcontrollers are using the AVR® CPU with hardware multiplier running at clock speeds up to 24 MHz, with 64 KB of Flash, 8 KB of SRAM, and 256 bytes of EEPROM. The microcontrollers are available in 14- or 20-pin packages. The AVR DD Family uses the latest technologies from Microchip Technology, with a flexible and low-power architecture, including the Event System, intelligent analog features, and advanced digital peripherals.

AVR® DD Family Overview

The figure below shows the AVR DD Family devices, laying out pin count variants and memory sizes:

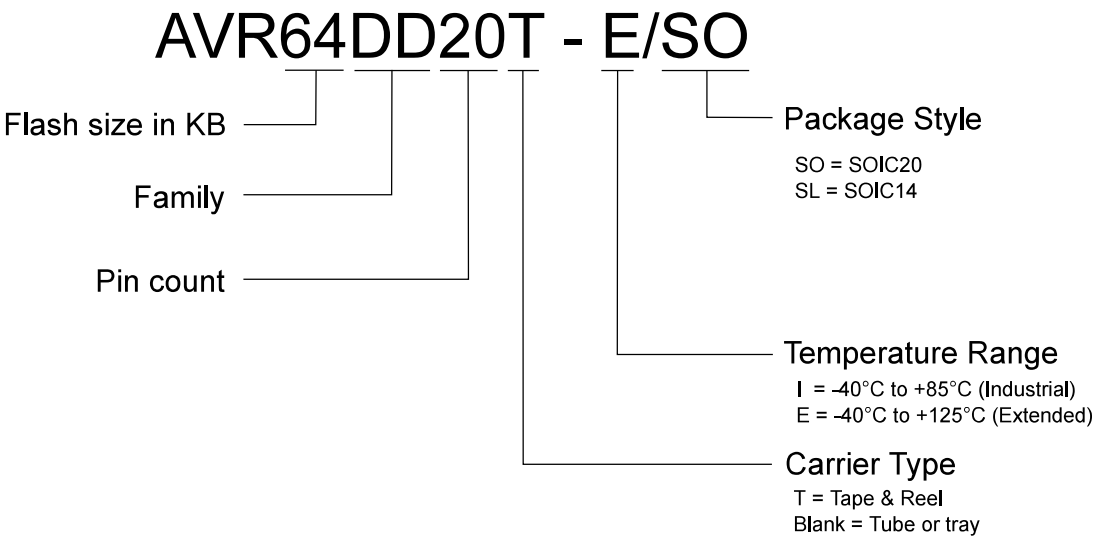
- Vertical migration is possible without code modification, as these devices are fully pin and feature compatible
- Horizontal migration to the left reduces the pin count and, therefore, the available features

Figure 1. AVR® DD Family Overview



The name of a device in the AVR DD Family is decoded as follows:

Figure 2. AVR® DD Device Designations



Memory Overview

The following table shows the memory overview of the entire AVR DD Family, but further documentation describes only the AVR64DD14/20 devices.

Table 1. Memory Overview

Devices	AVR16DD14 AVR16DD20 AVR16DD28 AVR16DD32	AVR32DD14 AVR32DD20 AVR32DD28 AVR32DD32	AVR64DD14 AVR64DD20 AVR64DD28 AVR64DD32
Flash memory	16 KB	32 KB	64 KB
SRAM	2 KB	4 KB	8 KB
EEPROM	256B	256B	256B
User row	32B	32B	32B

Peripheral Overview

The following table shows the peripheral overview of the entire AVR DD Family, but further documentation describes only the AVR64DD14/20 devices.

Table 2. Peripheral Overview

Feature	AVR16DD14 AVR32DD14 AVR64DD14	AVR16DD20 AVR32DD20 AVR64DD20	AVR16DD28 AVR32DD28 AVR64DD28	AVR16DD32 AVR32DD32 AVR64DD32
Pins	14	20	28	32
Max. frequency (MHz)	24	24	24	24
16-bit Timer/Counter type A (TCA)	1	1	1	1
16-bit Timer/Counter type B (TCB)	2	2	3	3
12-bit Timer/Counter type D (TCD)	1	1	1	1
Real-Time Counter (RTC)	1	1	1	1
USART	2	2	2	2
SPI	1	1	1	1

.....continued

Feature	AVR16DD14 AVR32DD14 AVR64DD14	AVR16DD20 AVR32DD20 AVR64DD20	AVR16DD28 AVR32DD28 AVR64DD28	AVR16DD32 AVR32DD32 AVR64DD32
TWI/I^{2}C[1]	1[1]	1[1]	1[1]	1[1]
12-bit differential ADC (channels)[2]	1 (7)[2]	1 (13)[2]	1 (19)[2]	1 (23)[2]
10-bit DAC (outputs)	1 (1)	1 (1)	1 (1)	1 (1)
Analog Comparator (AC)	1	1	1	1
Zero-Cross Detector (ZCD)	1	1	1	1
Configurable Custom Logic Look-up Table (CCL LUT)	4	4	4	4
Watchdog Timer (WDT)	1	1	1	1
Event System (EVSYS) channels	6	6	6	6
General Purpose I/O[3]	11/10[3]	17/16[3]	23/22[3]	27/26[3]
PORT	PA[1:0] PC[3:1] PD[7:4] PF[7:6]	PA[7:0] PC[3:1] PD[7:4] PF[7:6]	PA[7:0] PC[3:0] PD[7:1] PF[7,6,1,0]	PA[7:0] PC[3:0] PD[7:1] PF[7:0]
External interrupts	11	17	23	27
CRCSCAN	1	1	1	1
Unified Program and Debug Interface (UPDI)	1	1	1	1

Notes:

1. The TWI/I^{2}C can operate simultaneously as both host and client on different pins.
2. ADC inputs are available on MVIO pins (PORTC) if the MVIO is disabled in the SYSCFG1.MVSYSCFG fuse setting.
3. PF6/$\overline{\text{RESET}}$ pin is input only.

Features

- AVR® CPU
  - Running at up to 24 MHz
  - Single-cycle I/O access
  - Two-level interrupt controller
  - Two-cycle hardware multiplier
  - Supply voltage range: 1.8V to 5.5V
- Memories
  - 64 KB in-system self-programmable Flash memory
  - 256B EEPROM
  - 8 KB SRAM
  - 32B of user row in nonvolatile memory that can keep data during chip erase and can be programmed while the device is locked
  - Write/erase endurance
    - Flash 1,000 cycles
    - EEPROM 100,000 cycles
  - Data retention: 40 years at 55°C
- System
  - Power-on Reset (POR) circuit
  - Brown-out Detector (BOD)
  - Clock options
    - High-precision internal high-frequency oscillator with selectable frequency up to 24 MHz (OSCHF)
      - Auto-tuning for improved internal oscillator accuracy
    - Internal PLL up to 48 MHz for high-frequency operation of Timer/Counter type D (PLL)
    - 32.768 kHz ultra-low power internal oscillator (OSC32K)
    - 32.768 kHz external crystal oscillator (XOSC32K)
    - External clock input
    - External high-frequency crystal oscillator (XOSCHF) with Clock Failure Detection
  - Single-pin Unified Program and Debug Interface (UPDI)
  - Three sleep modes
    - Idle with all peripherals running for immediate wake-up
    - Standby with a configurable operation of selected peripherals
    - Power-Down with full data retention
  - Automated Cyclic Redundancy Check (CRC) Flash memory scan
  - Watchdog Timer (WDT) with Window mode, with a separate on-chip oscillator
  - External interrupt on all general purpose pins
- Peripherals
  - One 16-bit Timer/Counter type A (TCA) with three compare channels for PWM and waveform generation
  - Two 16-bit Timer/Counter type B (TCB) with input capture and signal measurements
  - One 12-bit PWM Timer/Counter type D (TCD) optimized for power control

  - One 16-bit Real-Time Counter (RTC) that can run from an external crystal or internal oscillator
  - Two USARTs
    - Operation modes: RS-485, LIN client, host SPI, and IrDA
    - Fractional baud rate generator, auto-baud, and start-of-frame detection
  - One SPI with host/client operation modes
  - One Two-Wire Interface (TWI) with dual address match
    - Simultaneous host/client operation (Dual mode)
    - Philips I^2C compatible
    - Standard mode (Sm, 100 kHz)
    - Fast mode (Fm, 400 kHz)
    - Fast mode Plus (Fm+, 1 MHz) (1)
  - Event System for CPU independent and predictable inter-peripheral signaling
  - Configurable Custom Logic (CCL) with four programmable Look-up Tables (LUTs)
  - One 12-bit differential 130 ksps Analog-to-Digital Converter (ADC)
  - One 10-bit Digital-to-Analog Converter (DAC)
  - One Analog Comparator (AC)
  - One Zero-Cross Detector (ZCD)
  - Internal 1.024V, 2.048V, 2.500V and 4.096V voltage references, and external reference option (VREF)
- I/O and Packages:
  - Multi-Voltage I/O (MVIO) on I/O port C
  - Selectable input voltage threshold
  - Up to 17/16 programmable I/O pins
  - 20-pin SOIC
  - 14-pin SOIC
- Temperature Ranges:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C

Note:

1. I^2C Fm+ is only supported for 2.7V and above.